Small Business Innovation Research/Small Business Tech Transfer

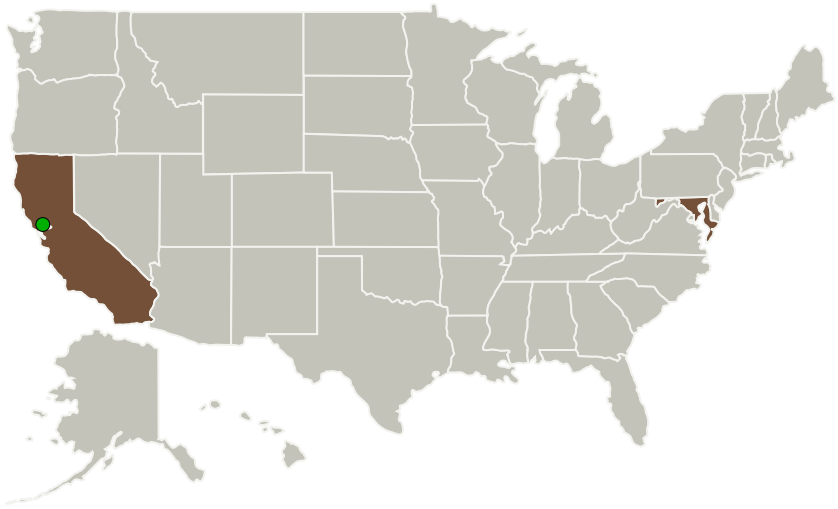
A Flexible Fault Management Architecture for Cluster Flight, Phase II

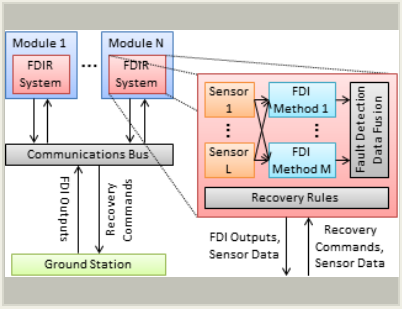
Completed Technology Project (2014 - 2016)

Project Introduction

In the near future we will see the development of space mission architectures where multiple spacecraft work cooperatively as a cluster to achieve mission objectives. Fault management (FM) is a critical challenge that must be addressed, especially when multiple spacecraft are working in proximity. Automatic fault management reduces the effort required by the ground crew when faults occur, and it reduces the chance of collision by quickly recovering from faults. We are developing a Flexible Fault Manager for Distributed Systems (FFMDS) for these missions. FFMDS is a FM architecture that will include algorithms to be run on each cluster module for fault detection, isolation, and recovery; software to be used at a ground station to direct recovery actions; and protocols for communication of fault information between cluster modules and between modules and the ground station. The architecture is service-oriented, so that algorithms for fault detection, isolation, and recovery can be added to or subtracted from the system as appropriate.

Primary U.S. Work Locations and Key Partners





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Organizations Performing Work	Role	Type	Location
Emergent Space Technologies, Inc.	Lead Organization	Industry	Greenbelt, Maryland
Ames Research Center(ARC)	Supporting Organization	NASA Center	Moffett Field, California

Primary U.S. Work Locations	
California	Maryland

Project Transitions

April 2014: Project Start

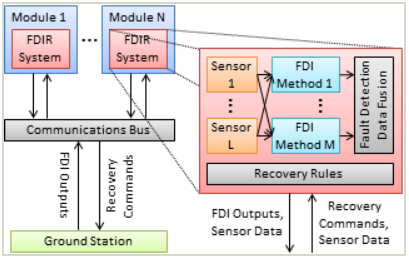
April 2016: Closed out

Closeout Summary: A Flexible Fault Management Architecture for Cluster Fligh t, Phase II Project Image

Closeout Documentation:

- Final Summary Chart Image*(https://techport.nasa.gov/file/137605)*

Images



Briefing Chart Image
A Flexible Fault Management Architecture for Cluster Flight, Phase II
(https://techport.nasa.gov/image/132753)

Organizational Responsibility

Responsible Mission Directorate:
Space Technology Mission Directorate (STMD)

Lead Organization:
Emergent Space Technologies, Inc.

Responsible Program:
Small Business Innovation Research/Small Business Tech Transfer

Project Management

Program Director:
Jason L Kessler

Program Manager:
Carlos Torrez

Principal Investigator:
Matthew C Ruschmann

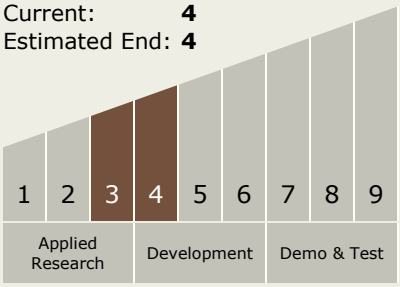
Co-Investigator:
Matthew Ruschmann

A Flexible Fault Management Architecture for Cluster Flight, Phase II

Completed Technology Project (2014 - 2016)

Technology Maturity (TRL)

Start: **3**
Current: **4**
Estimated End: **4**



Technology Areas

Primary:

- TX17 Guidance, Navigation, and Control (GN&C)
  - TX17.5 GN&C Systems Engineering Technologies
    - TX17.5.2 GN&C Fault Management / Fault Tolerance / Autonomy

Target Destinations

The Sun, Earth, The Moon, Mars, Others Inside the Solar System, Outside the Solar System